

Introduction: The global pandemic due to the novel coronavirus (COVID-19) has had unprecedented effects on society, in particular for those who are also working with children in the household. The aim of this analysis was to evaluate sleep amount and sleep quality during the COVID-19 pandemic compared to before COVID-19 for those working from home with minor household dependents.

Methods: We developed the “Anonymous Survey on Confinement during the COVID-19 Pandemic”, a national survey for individuals ≥ 18 years of age hosted on the Penn Medicine Clinical Research website from May 16th to November 11th, 2020. This 200 question survey captured demographics and multiple dimensions of health and well-being, including stress, sleep, eating behaviors, and coping activities. Respondents who indicated they were working from home were stratified by whether they were living with ≥ 1 minor dependent vs no dependents. Separate ordinal logistic regression models were used to evaluate associations between living with a minor dependent and sleep amount (less, same, more) and disturbed quality (none, less, same, more) during, compared to before, COVID-19 controlled for age, sex, ethnicity, and annual income.

Results: A total of 232 respondents ($n=182$ no dependents, $n=50$ dependents, 84.9% Caucasian) reported working from home, the majority of which had been in confinement (95.7%). Respondents with dependents were younger (mean age 38.9 ± 13.5 vs 47.4 ± 18.0 , $p=0.002$) and mostly female (86% vs 76.9%, $p=0.03$). On average, reported days worked/week (3.5 ± 2.4 days) and hours worked/day (5.5 ± 4.17 hours) were similar regardless of dependents. Comparing those without to those with minor dependents, there were no significant differences in log odds of getting enough sleep ($\beta=-0.38$, $p=0.25$) or worse sleep quality ($\beta=0.41$, $p=0.22$) during the COVID-19 pandemic compared to before COVID-19. Respondents with dependents reported a higher log odds of taking longer to fall asleep during COVID-19 ($\beta=0.71$, $p=0.045$), and higher stress ($\beta=-0.65$, $p=0.04$).

Conclusion: In this mostly Caucasian female sample of people working from home, having minor dependents in the household did not significantly impact sleep amount or quality compared to no minor household dependents. However, respondents with dependents reported longer time to fall asleep and were more stressed.

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SLEEP SCHEDULE CHANGES DURING THE COVID-19 PANDEMIC: RELATIONS TO CIRCADIAN PREFERENCES

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Introduction: The COVID-19 pandemic profoundly altered individual lifestyles, reducing commutes and restricting nocturnal in-person socialization. We examine whether the stay-at-home orders and the attendant increase in sleep scheduling autonomy, impact bedtimes and waketimes and influence circadian preference alignment.

Methods: We compared bedtimes and wake times during the 4 weeks before and after a March 19th, 2020 stay-at-home order announcement. Data from the PSG-validated SleepScore Mobile Application were analyzed. Users answering a circadian preference question (a five-point Likert scale ranging from “definitely a morning person” to “definitely an evening person”) who also recorded 10 or more nights of sleep both before and after the March 19th announcement were included in the analysis. The data set included 69,656 total nights of sleep from 1,487 users: 51.0% female, age range 18 to 91 years (mean = 50.3 ± 30.3). Differences in average bedtime and wake time before and after March

19th were compared using paired sample t-tests. Associations between circadian preference and changes in bedtime and wake time were examined using Spearman’s correlation coefficient.

Results: All five circadian preference groups showed a significant delay in both bedtime and wake time ($p < .01$) after the March 19th announcement. Greatest delays were observed in those reporting the strongest eveningness preference, with median bedtimes being 17 minutes later and wake times 33 minutes later. Delays were smallest in users with the strongest morningness preference, with bedtimes being 7 minutes later and wake times 12 minutes later. Wake time delay was significantly greater than bedtime delay for evening types ($p < 0.001$) but not morning types. Eveningness preference was associated with greater bedtime delay (Spearman correlation = 0.098, $p < 0.001$) and wake time delay (Spearman correlation = 0.178, $p < 0.000001$).

Conclusion: The stay-at-home order provided many individuals more freedom to choose their sleep schedule. This increased sleep scheduling autonomy was associated with delayed bedtimes and wake times for each circadian preference group, with the evening-types exhibiting the greatest shift towards a later sleep schedule. We conclude that stay-at-home orders allowed evening types to choose sleep schedules more aligned with their natural tendencies.

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SOCIAL INTEGRATION AND SLEEP QUALITY DURING THE COVID-19 PANDEMIC: PROSPECTIVE EVIDENCE FROM A STUDY OF RETIRED OLDER ADULTS

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Introduction: Growing evidence has documented the adverse impact of the global coronavirus pandemic on sleep quality. Older adults may be especially susceptible to declines in sleep quality for multiple reasons, including their elevated risk of social isolation and loneliness during the pandemic. Given the adverse health consequences of poor sleep, there is a need to identify resilience factors that help protect older adults against decreased sleep quality. Social integration is a plausible resilience factor because involvement in a broad range of social relationships is thought to promote psychological well-being (e.g., meaning, purpose in life), as well as reduce the intensity and duration of negative psychological states. Social integration may also assume increased importance during the coronavirus pandemic because of normative declines in overall social contact. This prospective study assessed the impact of the coronavirus pandemic on older adults’ sleep quality and tested whether social integration moderated the impact of the pandemic on sleep quality.

Methods: A sample of 115 retired older adults (mean age = 68.6, 58% female, 89% white) completed self-report assessments of their social integration (number of roles on Cohen’s Social Network Index) and sleep quality (global score on Pittsburgh Sleep Quality Index) before and after the onset of the coronavirus pandemic (mean duration of follow-up = 2.3 years).

Results: Multilevel analyses indicated that social integration moderated the impact of the coronavirus pandemic on sleep quality; there was no main effect of time. Older adults with low social integration had reduced sleep quality from Time 1 to Time 2 ($b=.94$, $p=.02$), whereas older adults with high social integration showed no changes in sleep quality over time ($b=-.38$, $p=.37$).

Conclusion: Broader social networks confer resilience against pandemic-related declines in sleep quality among older adults. The level of social integration should be addressed when studying or

treating sleep complaints during the coronavirus pandemic. Additional research is warranted to determine whether psychosocial interventions targeted towards older adults with low social integration can reduce observed differences in sleep quality.

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COVID-19 RELATED STRESS INTENSIFY THE IMPACT OF CHILD MALTREATMENT ON SLEEP QUALITY

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Introduction: Child maltreatment (CM) is a significant stressor that is associated with sleep problems in children and adolescents. The COVID-19 pandemic introduces new psychosocial stressors, which may be particularly harmful to youth already experiencing stress in the home environment. Using multi-dimensional (threat vs deprivation) assessments of CM, the present study aimed to test whether COVID-19 related stress intensified the association between maltreatment (abuse vs neglect) and sleep problems among youth.

Methods: This study utilized data from a longitudinal sample of youth (N=126; Mage at T1=12.9) assessed between January 2019 and March 2020 (T1) and after the beginning of the COVID-19 pandemic (May 2020; T2). Latent factors for COVID-19 related stress included three questions asking about negative changes, uncertainty about the future, and stress-induced by disruptions. CM at T1 was measured with the Childhood Trauma Questionnaire (CTQ). Multidimensional aspects of CM included a threat factor (sum of Emotional, Physical, and Sexual Abuse) and a deprivation factor (sum of Emotional and Physical Neglect). Sleep-related problems at both T1 and T2 were assessed using the Pittsburgh Sleep Quality Index (PSQI) global score. Structural equation modeling was conducted in Mplus 8.1 to test direct and interaction effects of CM and COVID-19 related stress on sleep problems at T2 while controlling for sleep problems at T1 and demographic covariates.

Results: Threat-related abuse was significantly associated with increased sleep problems at T2 ($\beta = .43$, $p < .01$) but neglect was not ($\beta = .03$, $p = .85$). Additionally, COVID-19 related stress significantly intensified the link between abuse and sleep problems ($\beta = .14$, $p < .05$) as well as between neglect and sleep problems ($\beta = .43$, $p < .01$) at T2. Among youth who experienced higher levels of CM, increased COVID-19 related stress exacerbated sleep problems.

Conclusion: These results bolster extant research on the negative impact CM bears on youth sleep health and indicates that COVID-19 stress may exacerbate sleep problems. Our findings inform future prevention and intervention efforts that aim to reduce sleep problems among youth who experience CM during the COVID-19 pandemic.

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SLEEP DURATION AND SLEEP QUALITY IN CHRONIC CANNABIS USERS AND NON-USERS

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Introduction: Cannabis use is on the rise in the United States, with 10% of adults reporting cannabis use in the past 30 days. Users commonly report consuming cannabis to improve sleep despite the lack of research that supports an association between cannabis use and sleep.

In this pilot study we sought to examine objective measures of sleep duration and sleep quality among non- and chronic-cannabis users, and any patterns in relation to the time since consumption of cannabis.

Methods: Chronic cannabis users (cannabis used 2 or more times/week) and non-users provided up to 2-weeks of actigraphy (ActiGraph wGT3X-BT), worn on the wrist and verified by sleep diary. Chronic cannabis users also reported the date, time, amount, and route of their cannabis use. Mixed-effects models with participant as a random factor were used to examine: 1) the relationship between daily sleep parameters in cannabis non-users vs. users; and 2) the elapsed time between cannabis use and time in bed in chronic cannabis users.

Results: Chronic cannabis users (n=6) and non-users (n=7) collectively provided 151 nights of sleep. Participant characteristics (38.5% female; age, 25.8 years \pm 4 years; BMI, 23.4 kg/m² \pm 3.4 kg/m²) did not significantly differ between groups. Cannabis use was associated with decreased total sleep time (measured in hours, $\beta = -0.58$, $p < 0.001$) and increased wake after sleep onset (WASO, $\beta = 32.79$, $p = 0.005$), but not with the number of awakenings ($\beta = 6.02$, $p = 0.068$). Among chronic cannabis users, cannabis use within two hours of bed was associated with increased sleep latency compared to use greater than two hours ($\beta = 6.66$, $p = 0.026$). There was no association between time of cannabis use and WASO ($p = 0.621$) or the number of awakenings ($p = 0.617$).

Conclusion: In this pilot study of objectively measured sleep, we found that chronic cannabis use compared to non-use is associated with decreased sleep duration of otherwise healthy adults. Cannabis used closer to bedtime is associated with increased sleep latency. Additional studies that are able to assess the mode and dosage of use are needed to further understand the effects of cannabis and its components on sleep.

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DIGITAL MEDIA USE AND SLEEP IN COLLEGE STUDENTS DURING COVID-19 PANDEMIC

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Introduction: To address the growing sleep deficiency epidemic in college students, more research is needed on recent factors that might affect sleep, such as the digital media use in this young adult population. Furthermore, sleep and the use of digital media can be heavily influenced by the COVID-19 pandemic. The purpose of this study is to examine the use of digital media during the pandemic, and its relationship with sleep disturbance, social isolation, physical and mental health in college students.

Methods: An online survey was sent out to college students enrolled in an urban university. Validated questionnaires including PROMIS (Sleep Disturbance, Global Mental Health, Global Physical Health, Social Isolation), Nighttime Media Usage, and Internet Addiction Test were included in the survey. In addition, focus groups were conducted with a subsample of survey respondents to elicit a comprehensive understanding of how digital media use in daily life influences sleep during the COVID-19 pandemic. Data collection was conducted during June to December 2020.

Results: A total of 358 students completed the online survey. Sleep disturbance was significantly related to greater digital media use for recreational purposes two hours before bedtime (62.6 \pm 28.1 minutes, $r = 0.110$, $p = 0.046$), and a higher frequency of playing games ($r = 0.148$, $p = 0.007$) and using social media after going to bed ($r = 0.142$, $p = 0.10$).